Methodology for the Implementation of Knowledge Management Systems in the University

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Abstract. This paper describes a methodology for the implementation of knowledge management systems in the university context, based on the study and adaptation of the most recognized methodologies in this area, as well as considering the strategic planning and systemic approach, which facilitates the development of technological support systems.

The methodology aims to integrate and standardize the different phases and activities required to manage this type of systems in the university, strategically establishing the most important activities and adopting actions for their development, in order to facilitate organizational strengthening, academic, scientific or technological.

Its main structure emphasizes a spiral approach that represents the infinite recurrent development between its different phases and activities, and that leads to improvement through an iterative and incremental process, since new plans or activities can be added to achieve the objectives.

Keywords: Methodology · Knowledge management
Knowledge management systems · Iterative process · Incremental process

1 Introduction

A *Knowledge Management System* is a platform of technologies of information and communications (ICTs) that supports the processes of the knowledge management in the organization.

However, in order to implement a knowledge management system, it is necessary to apply an adequate methodology that facilitates this process. It is also necessary to know and be clear in the conceptualization of knowledge management (treated very generally in the next session).

There are many methodologies to undertake knowledge management, but they are of an organizational type, with a business focus, which is why this work focused on the development and adaptation of a methodology that had the components for the university.

Aware of the evolution and impact of knowledge management in our society, it´s observed that existing methodologies are enunciated for the implementation of knowledge management, but do not go into depth in the concept of knowledge management system and are not applied specifically to the university [10]. Which is why it's intended to delineate and deepen a methodology that covers the different aspects required in this process of knowledge management in the university.

2 Fundamentation

The fundamental concepts about knowledge management, as well as the most recognized methodologies, it will be discussed below.

2.1 Conceptualization of the Knowledge Management

The first studies that treat the topic of the knowledge management directly, date approximately of the last decade of the XX century, however the first entity that really implants the knowledge management, is *the University*, but paradoxically the biggest advances in this area have seen each other in the managerial organizations.

In the first place, it is necessary to understand the term management, it that is defined as "the process by means of which is obtained, deploys or it uses a variety of basic resources to support the objectives of the organization" [1]. According to Firestone, management is the "I manage, address, regulation, control, coordination and organization of the processes and its results" [2].

From this point of view, the knowledge management should fulfill this concept, understanding as resources, to the knowledge in yes.

Of another side, according to the great impact and the relevance that this having the denominated *Knowledge Society* in the different organizations, we appreciate countless concepts and/or definitions that around this topic different experts have outlined in the area, which are varied forms of conceiving what is known as *Knowledge Management,* the one which still, it has not been possible to unify their approaches [3]. In general, some speak of knowledge management, others of organizational learning, some of intellectual capital, and even of active intangible. Without a doubt, the terminology doesn't help to clarify of what one is speaking. The same concepts are sometimes introduced with different denominations. A test of the previously exposed thing is the study carried out by the investigating Paul Quintas, Paul Lefrere and Geoff Jones where it is revealed that after making a search in more than 100 places of Internet that mentioned aspects of the knowledge management, it was a range of interests, perspectives and related matters, among those that figured [4]:

- The knowledge like economic or organizational capital.
- Engineering focuses that seek to improve the use of the information in support to the factory processes.
- Calculation aspects and means of knowledge.
- Organizational studies from the anthropological point of view, of evolutionary biology, sociology, etc.

- Epistemology, learning, psychology of the knowledge, etc.
- Definition aspects and classification from the point of view of the artificial intelligence, science of the information, linguistics, philosophy, etc.
- Places have more than enough human resources that mention work categories as Intellectual Capital Manager, Knowledge Capital Manager, as well as other such traditional works as Information Manager, Librarian of Investigation and Development, etc.

Of there, that it has adapted of Robles (1999) [5], the following concept of knowledge management that includes three conceptualizations (organizational, university and technological) and in which this investigation has been focused: "The knowledge management makes reference to the planning, organization, address, coordination and control of a net of people incorporated in the processes of the organizational culture, supported by the technologies of the information and the communications, that it looks for the creation, acquisition, adaptation, assimilation, organization, transmission, use, conservation and protection of the knowledge, generating intellectual, tangible and intangible benefits, guided to potentialize the organizational competitions and the generation of value" [3].

This definition makes direct reference to the management of the group of people and technologies. People are the only ones enabled to create knowledge, and for the other side the technologies are the most potent tools to amplify, to code and to put to disposition of other the knowledge created by some, in more and more global organizations.

In this definition, the knowledge is the well more valuable of the organization, but its utility resides in the form in that it is potentialized. The innovative ideas, the resolution of problems and the correct one taking of decisions depend on the knowledge incorporated in people (management of the human talent) and of the agile access to support information, structured in the appropriate terms (use of the technology).

The knowledge registered in appropriate structures of information and the registration of the new knowledge that become valuable information for the whole organization, they are incorporated in the decisions that constantly they take in the company and they support the generation of new ideas that you/they start the improvement of the organization and they can drive to competitive advantages.

It is necessary to recognize that, in fact, what flows among different agents is never knowledge like such, but data (information). It is possible to approach the knowledge of two agents that they share the same data, but due to their previous experiences and to the differences in the way of processing the data (mental models, organizational models, investigative models), they will never have the same tendencies for the action, neither identical states of knowledge. We can only get approaches, since the internal and external context of an agent is always different to another. This is this way, because the knowledge is on information inside a context (experience).

It seems clear that the development of knowledge it's done with the objective of using it in the attainment of sustainable competitive advantages, not simply accumulating knowledge without applying it.

2.2   Methodologies for the Implementation of Knowledge Management in Organizations

Inside the methodologies more diffused for the implementation of the knowledge management, we can mention:

- *Tiwana.*
- *Project EKMF (European Knowledge Management Forum).*
- *Ibermática.*
- *APQC Best Practice Study on KM Implementation.*
- *PriceWaterHouse Implementation Methodology.*
- *CommonKADS (methodology of knowledge engineering)* and others.

However, in this research work, it is emphasized or it takes like base the methodology of Tiwana perhaps to be the good known one [6], and the methodology of the project EKMF (European Knowledge Management Forum), because their intention is the standardization. Both, they have been the base to formulate a methodology that seeks to cover the unification and complementation like guide to implement a project of knowledge management in an organization.

3   Estructuring of the Methodology to Implement a Knowledge Management System in the University

Given that this research is the complement of other research developed by the authors of this article, and which focused on analyzing and designing a knowledge management model at the university, the model context it's taken as a basis for its understanding and after, the methodology itself is applied and explained.

3.1   Knowledge Management Model in the University

The model in the university, expresses the need to connect the external environment through the internal management process based *on knowledge* (Fig. 1). The model is based on three interconnected nodes, which are supported by different types of activities in the university. The nodes are knowledge-based resources, which generates, transfers knowledge and can perform various processing functions that required treatment internally or through network links. The *nodes* of the model are [8]: *Knowledge Node or Core:* This is the main axis model since this node serves as a repository of knowledge. It shows how to generate and disseminate knowledge at the university and the enterprise. *Academic Node:* Refers to the activities of the academic area such as: the production of knowledge, professional training, and social culture. The teaching and research are part of these activities usually seek training in the service of human society and the expansion of human knowledge. *Organizational Node:* This node functions involve guidance and support to enable university activities and relate specifically to the leadership, direction, supervision and control of the financial and administrative affairs of the university and all its dependencies. *Technology Node:* It's the infrastructure available that creates, access, and disseminate knowledge.

This includes standard programs developed to measure access to telecommunications, intranet, extranet and user support and all locally or remotely. Using these tools and participating employees share the content on their daily work processes. They also facilitate the learning process by allowing the organization and storage of knowledge.
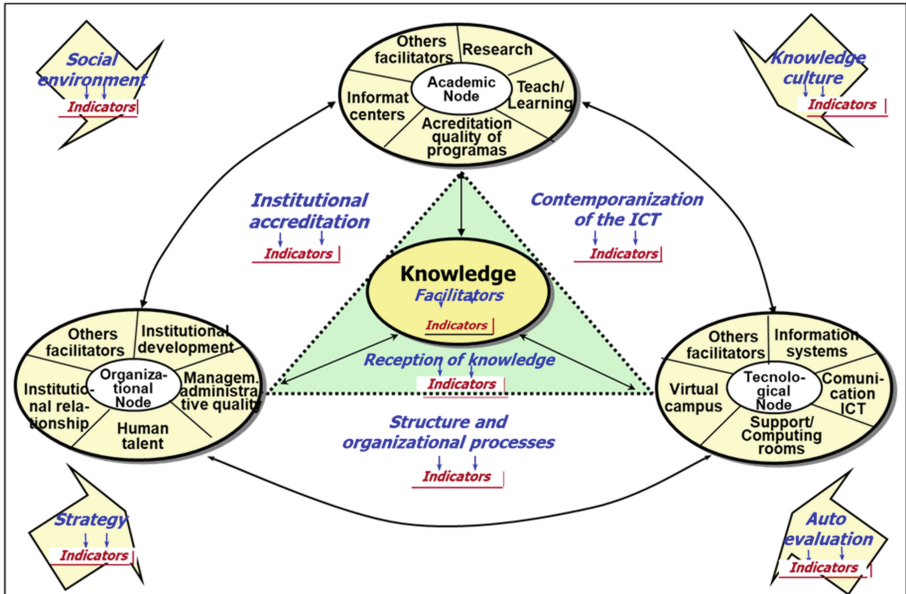

Fig. 1. Knowledge management model in the university. Source: [7, 8]

3.2 Methodology to Implement a Knowledge Management System in the University Management Model in the University

Once conceptualized the abstraction and vision of the educational organization in a model, are necessary to define what initiatives and in what order they will start. Each organization needs to define or to adapt its own model of knowledge management, also applying a *methodology* for its implementation. Based on the analysis of the diffused methodologies and especially the proposal of the european standard (*EKMF*) [9], *Tiwana* [6] and GC-U of Medina [7], it thinks about a methodology that seeks to involve besides the organizational aspects, the technological details that are required to support the knowledge management in the university.

Structurally the methodology is composed of *phases* that it picks up the initial position of a situation (to see Fig. 2), with the whole chain of actions that it is necessary to carry out until arriving to the new wanted situation. These phases facilitate the development of a modulate procedure, in such a way that you are carried out parts of the system like independent subsystems that cover their performance environment, in the course of the time but guided to an integration of all them [7].
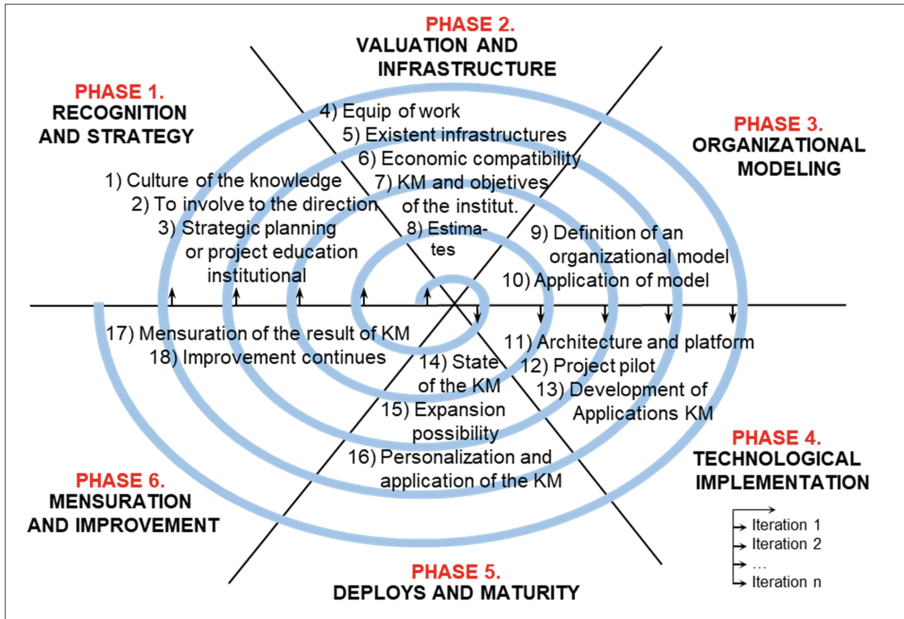
Fig. 2. Methodology for implement a knowledge management system in the university - GC-U. Source: Authors

The phases are formed by a group of *activities,* that they should carry out when the phase is executed. The activities are been able to desaggregation in turn in *tasks,* which not necessarily have to be carried out in a successive way but rather their structure has been outlined with a concurrent development by groups, what provides a saving in the execution terms and costs.

The task is the basic unit that possess a content and some actions to carry out. In a general way, each task can be structured in a series of such acts as: Sources of available information, steps or processes to carry out or factors that can have incidence in their execution, support tools, products or results and advice to facilitate the execution of each task.

In turn, the methodology emphasizes (Fig. 2), a focus in *hairspring* that represents the development recurrent infinite among its different phases and activities that lead to the improvement through a process *iterative and incremental*. It is *incremental* because new plans can be added to reach the goals, it is *robust and stable* since when maintaining the goal it admits changes in the behavior if she stays the same goal and it is to modulate because the plans are modulates.

The methodology this structured in six phases, those that in turn are constituted by activities that are detailed in the following way.

Phase 1. Recognition and Strategy

It seeks to verify if the educational organization knows on the KM, its benefits and if it is of interest for her; and this way to have the perception and motivation from the high address to define strategic plans.

(1) Culture of the knowledge and interest in the knowledge management and their benefits.

   – Analysis and diagnostic of the real situation, related with the necessities and opportunities of negotiating the knowledge.
   – Creation of a map of knowledge in the university.
   – Verify if the members or groups in the institution know on the knowledge management, their benefits or if the knowledge management is key for the interests of the organization.

(2) To involve to the management of the organization.

   – To create directive positions with the perception of the principles, benefits and a sincere motivation to manage the knowledge management.

(3) Strategic Planning.

   – To identify the debilities, threats, strengths and opportunities (Matrix DAFO) and to define the plan strategic institutional or also called plan of institutional development.

Phase 2. Valuation and infrastructure

It is evaluated if, there is a technological and intellectual infrastructure in the organization. One of the first tasks that the team of knowledge management needs to work is the understanding of the strategic project, the organizational, technological context, the financial considerations, and the short term and long term goals. This diagnosis helps to the strategic orientation of the organization and to understand that the administration project of knowledge is a mutually beneficial position.

(4) Equip of work.

   – To create a work team to negotiate the first steps of the knowledge management.

(5) Existent infrastructures.

   – To analyze the existent infrastructure and to look for the existent holes.

(6) Economic compatibility.

   – To analyze the economic resources that can affect the development of the knowledge management.

(7) Knowledge management and objectives of the institution.

   – The strategies and objectives of the knowledge management have to agree with the objectives of the institution.

(8) Estimates.

  – To establish the planning of activities as much in duration as in costs.

Phase 3. Organizational modeling

One in the most useful ways to understand, to study and to represent the phenomenon of the knowledge management in any type of educational organization, it is through a model, since she offers a vision more or less unified and it completes on what wants to absorb of the reality on this knowledge management.

(9) Definition of an Organizational Model of Knowledge Management.

  – Description of resources of knowledge (nodes or agents), facilitators and management indicators, including requirements and technical specifications.

(10) Application of the Organizational Model.

Phase 4. Technological implementation

They are defined the technological structures that have incidence in the organization, establishing the conceptual architecture to develop and to implement the Knowledge Management System. And it intends or it adapts a technological platform, that is to say a group of norms, hardware tools and software to knowledge manage in the organization, where they are defined the components of more transcendency and in which plans and actions should be adopted for their development, initially a project pilot is implemented.

For the development of support software to the knowledge management system, different techniques should be applied so much of software engineering as of engineering web and of course of the knowledge engineering.

(11) Architecture and Technological Platform.

  – To define and to structure the components of the technological architecture.
  – To select the technological components of a collaborative platform.
  – To optimize the granularity of the objects of knowledge (detail level).

(12) Project Pilot.

  – Selection of alternatives to develop.
  – Design, development and implementation of facilitators of knowledge.
  – Monitorization and contrasting of the obtained results.

(13) Development of Applications of Knowledge Management.

  – Design of interfaces for the interaction and integration of applications.
  – Develop and integration of applications, intermediate software (middleware), bequeathed applications and systems of knowledge.
  – Integration and escalation of repositories of knowledge.
  – Develop of a portal of knowledge.

Phase 5. Deploys and maturity

Once implemented the knowledge management system in a project pilot or area specifies, it owes himself expand or to implement in the different areas of incidence of the organization, for that which is necessary to evaluate its respective administration.

(14)   State of the knowledge management.

– To evaluate the current state and the maturity of the knowledge management. To verify the state of the project pilot and the potentiality for the development of the project.

(15)   Expansion possibility.

– To evaluate the expansion opportunity and the possibilities of initiatives of knowledge management along the organization under a demand of this knowledge management expressed by other departments.

(16)   Personalization and application of knowledge management.

– To build a global scenario of the solution, plans and priority of the steps required to personalize and to implement the project of administration of the knowledge, with the purpose of throwing the expansion of the project of knowledge management.

Phase 6. Mensuration and improvement

Applying to the adage that "it is well known that what you cannot be measured cannot manage", a mensuration model should think about based on the quality of the knowledge and in the improvement continue.

(17)   Mensuration of the results of the knowledge management.

– To measure the results of the knowledge management: calculating the return of the investment (ROI) for the investors of the knowledge management. On the other hand, applying a model of mensuration of indicators of knowledge management.

(18)   Improvement continues.

– Evaluation of the results and tests continue to improve the implemented solutions.

4   Methodology Validation Considerations

For the validation of the methodology, time and evaluation of results in the medium term is required, which is being implemented, why cannot yet present in this paper.

In the methodology presented in this research, the dynamic analysis of systems with knowledge management methodology proposed by the European Guide is combined and aims to create an assessment instrument of knowledge management network in the introduction incremental innovations in product, service and process for a enterprises, that deploy a range of possibilities for development and innovation of social

technologies. Therefore, that leads organizations, increase their competitiveness and reduce socio-economic difficulties that afflict both.

Furthermore, it is possible to deduce that the competitiveness of an organization it increase when the lines of knowledge and methodologies act synergistically in conjunction with contextual factors as the country's trade policies, tax policies, investment security and others, achieving an economic and productive development in the organization.

5   Conclusions

The methodology that intends is a guide so that each organization or institution can apply it or to adapt it according to its own reality and it reflects a work form, with the implications of the technologies of the information and the communications in the organizational community.

It understands each other that to implement a knowledge management system they are not necessary important investments in technology to act on some processes that, of being carried out in deliberate and careful form they can improve the management of the organization through the knowledge management and of course to achieve this way a cultural change toward the constitution of an inter-organizational net of knowledge.

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